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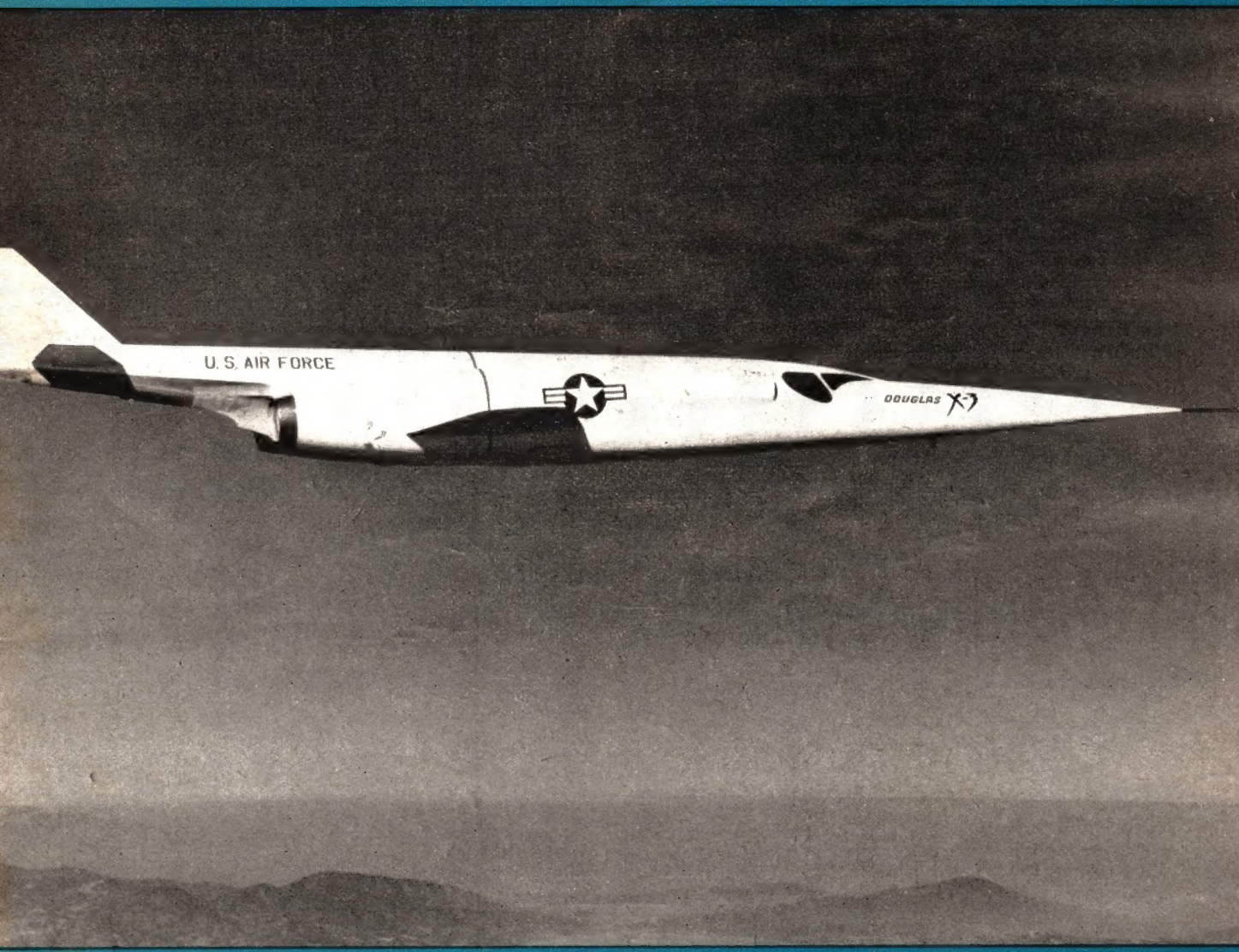
SCIENCE NEWS LETTER

®

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Supersonic Stiletto

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A SCIENCE SERVICE PUBLICATION

MEDICINE

Mass Polio Vaccinations

At least half a million children in second grade will receive polio vaccinations. First and third graders in the same schools, not yet selected, will serve as controls.

➤ AT LEAST half a million second grade school children throughout the nation will be vaccinated against poliomyelitis next year, Basil O'Connor, president of the National Foundation for Infantile Paralysis, stated in the first detailed announcement of plans for the world's biggest trial of vaccination to stop this crippling and sometimes killing disease.

Vaccinating will start in the southern states in the second week of February and will continue moving north until June.

The vaccine to be used is the one developed and tested by Dr. Jonas E. Salk of the University of Pittsburgh. It is made from polio viruses grown on monkey kidney tissue and killed with formalin. It is effective against all three known strains of polio virus. Because the viruses have been killed, it is considered perfectly safe to use.

The second graders will get three "shots" of the vaccine. The first two will be given one week apart. The third is a booster and will be given four weeks after the second "shot."

First and third grade children in the same schools will not get any of the vaccine and will serve as unvaccinated controls. After the 1954 epidemic season is over, there will be a scientific nose count to see how many children in each of the three grades got paralytic polio.

The 1954 vaccinating is to prevent the disease, if possible, by causing development of polio-fighting antibodies in the child's blood. It goes farther, therefore, in the way of protection than gamma globulin "shots." These "shots" gave the child antibodies against polio from pooled blood from many, many grown-ups who had developed the antibodies. The effect of the gamma globulin "shots" could only be temporary and at best only warded off the crippling or paralyzing effects of polio.

Children who will be vaccinated will get the vaccine "shots" if their parents volunteer to have them vaccinated. The schools in which the vaccination trials are to be run will be selected in counties that statisticians pick because of their past history of having a lot of polio. Selection of these counties and schools has not yet been finally made.

The time, February to June, and the start in the southern states were set to get the vaccinating done before the polio season gets underway. This is both to give the children greatest protection and to avoid spoiling the results by too many children having had a chance to develop immunity from contact with polio cases.

The vaccine will be made both by Dr. Salk and by several pharmaceutical firms.

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AERONAUTICS

"Supersonic Stiletto"

See Front Cover

➤ THE SLEEK, needle-nosed Air Force plane shown on the cover of this week's SCIENCE NEWS LETTER is a flying laboratory loaded with 1,200 pounds of research instruments.

The stiletto-shaped plane was designed to jab its way through the stratosphere at supersonic speeds and at secret altitudes.

To be used by the National Advisory Committee for Aeronautics, the Douglas X-3, as it is called, was created to test design features of an aircraft suitable for sustained flights at extremely high speeds.

Titanium, a strong, lightweight, heat-resisting metal, was used liberally throughout the X-3 to fortify it against the thermal barrier—heat created by air friction when a plane cuts through the sky at supersonic speeds.

In addition, the plane is artificially refrigerated. Insulation protects pilot, instruments and internal equipment from the scorching heat generated at the plane's research speeds.

The little craft is riddled with 850 pin holes through which readings are taken of air pressures around the plane's surfaces. Temperatures are logged at 150 points, while 185 electric strain gages keep tabs on stresses and air loads.

Physically the plane measures 66 feet, nine inches. Its stubby wings span a mere 22 feet, eight inches—less than the tail span on the DC-3 commercial transport plane.

It has been piloted by Douglas test pilot Bill Bridgeman, who pushed the D-558-II research plane to a record-shattering speed of 1,238 miles an hour Aug. 15, 1951. (Mr. Bridgeman's record was topped Nov. 14 of this year by NACA test pilot Scott Crossfield who flew the D-558-II at 1,272 miles an hour.) Performance of the new research plane, however, has not yet been revealed.

The X-3 was designed and built by the Douglas Aircraft Company's Santa Monica Division under joint sponsorship of the Air Force, NACA and the Navy. Previous research aircraft were the Air Force's Bell X-1, X-2, X-5 and the Northrop X-4, and the Navy's Douglas D-558-I and D-558-II.

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AGRICULTURE

Clay Particles Have Huge Surface Area

➤ ONE POUND of a common clay has a total surface area equal to 100 acres of land, M. L. Jackson and R. C. Vanden Heuvel, soil scientists at the University of Wisconsin, told the American Society of Agronomy and the Soil Science Association of America at a meeting in Dallas, Texas.

They reported on a new method for measuring the total surface area of particles in clay soils. This knowledge is important in the study of soils because nutrient elements and water are held on the flat surfaces of the particles. Clay samples are mixed with glycerol, the excess glycerol is removed and the amount remaining determines the surface area of the particles.

Using this method, they have found that an acre of land at plow depth with five percent montmorin clay has 10,000,000 acres of surface. This clay is found in many sections of the country.

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PHYSICS

New Method for Probing Stellar Reactions on Earth

➤ A NEW method for figuring here on earth what goes on at the extremely high temperatures found in the sun and other stars was revealed to members of the National Academy of Sciences meeting in Cambridge, Mass., by Dr. I. Amdur of the Massachusetts Institute of Technology.

His method consists, not in trying to duplicate in the laboratory temperatures of the order of thousands of degrees, but in obtaining basic information concerning the properties of gases by scattering beams of neutral particles with energies of 200 to 2,000 volts. The neutral-particle beam is scattered in a gas in much the same way that a flashlight beam is dispersed when it is shined into a murky solution. From the way the neutral particle beam is scattered, Dr. Amdur can calculate the desired gas properties.

Information on these properties can aid astronomers who are trying to find out if the universe is in a state of continual "creation," that is, with new stars being born out of cosmic dust all the time, since such cosmic dust is composed of gas particles. Dr. Amdur's data can also be used in calculating the rate at which the sun and other stars radiate energy into surrounding space.

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GENERAL SCIENCE

Standards Bureau Upheld

Special committee of National Academy of Sciences finds "without reservations" that work of National Bureau of Standards in lead acid storage battery testing is excellent.

➤ IN SUPPORTING the position of the National Bureau of Standards that the battery additive AD-X2 "is without merit," the committee of the National Academy of Sciences also made the following points:

AD-X2 behaves like a corresponding mixture of sodium and magnesium sulfates, and is substantially neutral in its effect upon a lead acid storage battery.

No new tests are needed as they "would do no more than reinforce the considerable reliability" of the conclusion drawn by the committee from the information now available.

No evidence was found that the personnel of the National Bureau of Standards were not objective but there was ample evidence of healthy objectivity. (Secretary of Commerce Sinclair Weeks in testimony March 31 before the Senate Committee on Small Business said: "The National Bureau of Standards has not been sufficiently objective, because they discount entirely the play of the market place . . .").

If benefits of AD-X2 were as claimed, laboratory tests would reveal them.

The report of the Massachusetts Institute of Technology casts no adverse reflections on the quality of the work of the Bureau of Standards on AD-X2.

Without reservations, the work of the Bureau of Standards in the field of lead acid storage battery testing is excellent.

There was "nothing mysterious or remarkable in the behavior of either AD-X2 or sodium and magnesium sulfates. In all cases the effects observed corresponded to well-known laws of physical chemistry."

Since the 1880's there have been frequent reports of additives. Many of them contained sodium and magnesium sulfates, which is not surprising since it appears that these materials are the least harmful chemicals that could be added to the battery electrolyte.

Usually testimonials are not given much weight, especially when controlled testing can be used, but in the present controversy they have played a major role. If testimonials are at variance with the results of well-designed controlled tests, the latter offer the only real proof.

The Academy committee consisted of ten scientists with Dr. Zay Jeffries of the General Electric Co. chemical division as chairman. It made its report and investigation at the request of Secretary Weeks after the AD-X2 controversy resulted in the "firing" of Dr. A. V. Astin, director of the National Bureau of Standards, who was, however, reinstated by Secretary Weeks in August.

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PSYCHOLOGY

Jet Pilot Reaction Time

➤ WHEN THE pilot of a jet plane sights an enemy jet approaching, it takes at least one-fifth of a second for his eye-nerve-muscle system to go into appropriate action, Dr. Leonard Carmichael, psychologist and secretary of the Smithsonian Institution in Washington, stated in Cambridge, Mass.

"It is very doubtful whether the best human reaction time of an ace pilot of the Korean war was different from that of a leading archer of the New Stone Age," Dr. Carmichael said in the Arthur D. Little memorial lecture at the Massachusetts Institute of Technology. But the jet plane, he pointed out, can move a lot farther in that fifth of a second than could an arrow.

The jet pilot, Dr. Carmichael explained, cannot by thought, education or wishing speed up beyond a certain fixed point the time his nerves must take in responding to the sight of the enemy. So it is up to those designing new airplanes, or even new political and economic systems, to learn what are man's inborn capacities and limitations. The differences between individuals must be recognized, and advantage be taken of the special abilities of the talented.

"Creative research of the highest order in the quantitative physical sciences," he said, "can be expected only from selected individuals in the upper two percent of the population in intellectual ability.

"Such rare and valuable talent bearers should be nurtured and helped to use their inborn capacities for the welfare of our scientifically based age.

"The world cannot afford to squander its scientific manpower!

"It is particularly wasteful of human resources when individuals recognized as singularly talented, and perhaps well trained in certain scientific or technical specialties, are allowed or required either in military or civilian life to perform tasks that others can do as well or even better."

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SENSITIVE "HEART"—The U-shaped prongs at center of this cutaway of the vibratory gyro are the key to the device. The vibrating U, which sings like a tuning fork, is analogous to the spinning wheel that operates conventional gyroscopes. Experimental models such as this can detect motions as slow as earth's rotation or as fast as 100 revolutions per minute or more.

PHYSICS

New Gyro Resembles Tuning Fork, Not Top

➤ A NEW gyroscope under development in Great Neck, N. Y., resembles a humming tuning fork, not a spinning top.

Known as a "vibratory gyroscope," the device is one of a series created by Sperry Gyroscope engineers at the U. S. Navy's request. It consists of small, electrically driven tines that swing to and fro rapidly like the prongs of a tuning fork. Engineers report it can measure rates of turn as slow as the earth's rotation and as rapid as 100 revolutions a minute.

Although several years of development may pass before the device is refined for simple application, engineers reported to the Institute of the Aeronautical Sciences that the device probably will supplement the present spinning gyroscope in long-range navigational equipment.

The inherent features of an experimental tachometer, which incorporates the new design gyro, were listed as these: a sensitivity only to rotation about a single axis, a wide scale through which measurements are possible with accuracy, a quick response to turning movements, a long life expectancy since it has few moving parts, and extreme ruggedness that fortifies it against vibration and shock encountered in the most grueling applications.

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CYTOLOGY

Study Fused Cells

➤ SINGLE-CELLED PROTOZOA, each smaller than a flyspeck, are being fused together in cancer research by Dr. Vance Tartar of Nahcotta, Wash.

Cancer cells, just as these tiny protozoa, are rugged individuals, unspecialized for any cell community activity. Dr. Tartar hopes by fusing the protozoa together to find out what makes cells specialize.

The American Cancer Society, which supports his work through a grant administered by Dr. Arthur H. Whiteley of the University of Washington, Seattle, says Dr. Tartar has in effect "built a giant single-celled animal" by clumping several protozoa together.

He gashes the sides of the barely visible, pear-shaped protozoa, *Stentor coeruleus,* and lets them grow together at the gashes.

In this manner, he has fused as many as 80 protozoa in a proto plasmic mass. Some specialization occurs in large clumps but complete specialization has been achieved only with a few fused cells.

The giant cell specializes, or differentiates, shortly after fusion. A head forms, and whip-like cilia sweep food-laden fluids inside the new mass. If this "head" is chopped off, another will grow to replace it.

Dr. Tartar has attempted to weld two strains of the protozoa, one blue and one green, together. He has succeeded in creating a patchwork of green and blue cells that survive for a little while.

Dr. Tartar is also adding cancer-causing chemicals to cultures of protozoa. He will attempt to determine whether these chemicals rob the cells of their ability to do specialized work and cause them to grow wildly, as they do when applied to animal tissues.

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MEDICINE

One-Second X-Ray

➤ THE TIME required to make an X-ray picture has been cut to one second. When X-rays were first discovered 58 years ago, pictures frequently took an hour.

A feature of an exhibit tracing the history of X-rays prepared by the Medical Museum of the Armed Forces Institute of Pathology in Washington is a life-size X-ray of a woman taken in one second by Arthur W. Fuchs of the Eastman Kodak Company.

The exhibit was given a preview showing in the national's capital before a conference of X-ray technicians. After six weeks at the museum, it will be sent on a tour of key cities in the nation.

Contrasting with the modern one-second picture is a set of glass plates showing the complete bone structure of a man taken by Dr. Dayton C. Miller in 1896 at the Case Institute of Technology in Cleveland, Ohio. In the first years of X-ray development, exposure times usually ranged between 30 minutes and one hour.

The scientific discoveries that contributed to Dr. Wilhelm C. Roentgen's discovery of the X-ray in 1895 in Wurzburg, Germany, are outlined in the exhibit, and the progress since then is traced.

The history of the use of X-ray equipment by the U. S. Armed Forces from the Spanish-American War to the Korean War is also a part of the exhibit. In the display is a portable unit built by the Picker X-Ray Corporation of New York for use at the front in Korea. This machine utilizes a Polaroid film processor to develop X-ray film in one minute.

A collection of early hand-blown tubes is included as well as a replica of a Crookes tube that was used by Dr. Roentgen.

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AGRICULTURE

Insecticides and Crops

➤ SOIL APPLICATIONS of the insecticides toxaphene and aldrin do not deposit residues of the chemical in vegetables that might be eaten by the public.

Drs. M. W. Stone, F. B. Foley and D. H. Bixby of the U. S. Department of Agriculture have reported that no detectable residues of these insecticides were found in lima beans, sweet potatoes and potatoes following three annual applications of the chemicals to the soil.

They discovered that 45% of the toxaphene remained in the soil 10 months after the second application, and 62% after the third application.

In addition to this aspect of their tests, they found that yields of tomatoes, peppers, cabbage, cauliflower, spinach, lettuce, beets, peas, sweet potatoes and Ventura lima beans were not affected by the insecticides. This part of the testing included chlordane and ethylene dibromide. The four insecticides are used primarily to control soil pests such as wireworms and other root feeders.

Following the second or third applications of toxaphene, a trend toward lower yields of Fordhook lima beans, celery and carrots was noted. After three applications of toxaphene, potato yields were reduced substantially. The yield of onions was reduced after the third application of ethylene dibromide, but this was due primarily to the discarding of much of the crop because of fusarium rot, they reported.

Tasters checking the vegetables for insecticide effect on flavor were unable to detect any off-flavor in green lima beans or tomatoes grown in soils treated with aldrin, chlordane and toxaphene, but they found potatoes to be significantly off-flavor.

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MERCURY DURING TRANSIT—Taken at 12:25 p.m. EST on Nov. 14 at the U. S. Naval Observatory in Washington, this picture shows the planet Mercury during its most recent transit of the sun, as it appeared by telescope. This rare astronomical event, when Mercury appears as a black dot on the sun, occurs only 13 or 14 times a century. (See SNL, Nov. 7, p. 298.)

MEDICINE

Girls Are Birthmarked Twice as Often as Boys

➤ GIRLS HAVE birthmarks twice as often as boys, Drs. W. Brandon Macomber and Mark K. H. Wang of Albany Medical College, New York, report in GP, the journal of the American Academy of General Practice.

This has led to the belief that the birthmarks, scientifically termed hemangiomas, may be related to the female hormones. A birthmark, the doctors pointed out in this connection, may start or may increase in size at the beginning of the teen age or at the start of pregnancy.

Most birthmarks, however, are present at birth or shortly thereafter and most are found on the head and neck. Malignant varieties are rare, and usually can be recognized by a tendency to ulceration and bleeding.

Cauterization, carbon dioxide snow, radiation, injection and surgical removal are treatments used to remove these. Surgical removal is the most effective, but may be used only in carefully selected cases. It is the treatment of choice in any birthmark that is fast-growing or suspected of cancerous change.

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AERONAUTICS

Airport Noise Complaints

Airplane noise is a real problem still to be solved, but some complaints of residents near airports can be blamed on politics and weather.

➤ POLITICS AND WEATHER are among the variables that swell and ebb the tide of complaints from residents living near noisy airports.

The Air Line Pilots Association told SCIENCE SERVICE that politicians frequently use airport noise as a political plank hewn to get votes. When this happens, stirred-up residents write letters of criticism they ordinarily would not have written.

Overcast skies have their own effect by reflecting airplane noises back to earth. Resembling mirrors in effect, the clouds intensify the sound entering open windows on the ground.

Airplane noise is a real problem that the industry is striving to conquer. However, the world's uncertain military situation is among the factors that are impeding progress.

All four-engined planes now in transport service are built for immediate conversion to military duty should the necessity arise. These planes largely have been developed with the design goal of achieving as much horsepower from the engine as possible. No consideration for noise has been worked into the engine design.

Furthermore, many airplanes now in commercial service were inherited from the Army Air Corps after World War II. These planes also were built to strike out at the enemy with the greatest efficiency. Noise was of little importance in their design.

Present planes could be made more silent if the operators reduced their payloads, the pilots' organization added. However, a reduced payload means less money to the airlines and this in turn means more taxes and government subsidies.

The airlines are trying to reduce the noise nuisance as best they can. At present, pilots of aircraft leaving some of the nation's largest airports are instructed to climb rapidly to an altitude of 1,200 feet before gathering full cruising speed. At this altitude, the plane's engine noise as heard on the ground is not as objectionable as when the plane circles at a lower altitude while gaining cruising speed under most atmospheric conditions.

The pilots' association also pointed out that most complaints come from residents near commercial airports. Few noise complaints are voiced by residents near busy military air bases. The Air Force reports it has succeeded in allaying fears through aggressive educational campaigns at two bases. The campaigns got underway when fleets of noisy jets were stationed there for the first time.

Complaints also seem to be tied in with noise's psychological effect. A low flying, powerful plane sometimes rattles dishes in the cupboard and frightens the housewife and her children.

Loud airplane noises can be compared to thunder, the Air Line Pilots Association reports. If you hear the noise, chances are that you are safe. This is because airplane noise is loudest when the plane is directly overhead. Should something go wrong, the plane would not plunge straight down upon your house. It would crash some distance away. Fear of overhead airplanes also has been traced to ignorance of the laymen regarding the relatively young aviation industry.

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METEOROLOGY

"Economy" Seen Reason For Weather Ship Cuts

➤ "ECONOMY" IS the reason for the latest cut in the number of ocean weather stations supplying wind and other meteorological data on which accurate weather forecasts are based.

Such economies, however, can lead to serious gaps in knowledge of the weather headed toward the United States, since the two ocean stations now being removed furnish information on North Pacific weather. The general trend of weather movement in the northern hemisphere is from west to east.

Announcement of U. S. intention to withdraw from the international North Atlantic weather ship network was made recently, also based on "economy" reasons. An argument presented in support of this move was that the weather moved from west to east, thus the weather reports form the Atlantic were of more value to Europeans than the U. S. (See SNL, Nov. 7, p. 294.)

Many meteorologists not connected with the government question whether it is possible to assign an exact, or even approximate, monetary value to the weather information received from the vast ocean areas by way of ocean weather stations.

They believe that only by obtaining as complete a picture as possible of weather conditions over most of the world will meteorologists be able to make new improvements in forecasting techniques, and thus more accurate weather predictions.

One of the most important present uses of ocean station weather data is in five- and 30-day forecasts.

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TECHNOLOGY

Sea Water Freshening

Three methods for changing sea water to fresh water being investigated in California: a solar distiller, power plant and distiller, and triple effect distiller.

➤ A CONCERTED effort to develop practical large-scale means of turning sea water into fresh water is now under way at the University of California.

University engineers place their hopes of providing cheap water from the sea for arid regions on three methods of distillation now being tested.

One unit is a solar distiller designed by Dr. Maria Telkes of Massachusetts Institute of Technology for the California project. This distiller consists of glass plates inverted to form a roof over a black tray containing sea water.

When visible sunlight passes through the glass roof, solar radiation is absorbed by the black trays and is re-emitted as warming radiation. This infra-red radiation cannot pass back through the glass, and is trapped in the still, thus raising the water temperature.

As sea water evaporates, the vapor condenses when it strikes the roof of the still, cooled by air circulating around the apparatus. The distilled water droplets trickle down the sides of the glass roof, and are passed into wooden drain troughs. Minerals remain in the tray.

Five stills four feet wide and 50 feet long yield 100 gallons of water a day. With a new design, the engineers hope to increase the yield to 160 gallons a day.

A second still combines a power plant and a distiller, which the French, in West Africa, have been working with since the 1920's. Warmed sea water is put in a vacuum chamber to speed up evaporation. The resulting water vapor is passed into a condenser, where it is converted into water droplets by cool water circulating in the condenser jacket.

An effort is being made to design this distiller so that water vapor passing through a turbine on its way from evaporator to condenser would provide the power to operate the pumps. This would provide a self-operating still.

A third experimental unit, a triple-effect distiller using waste heat from a diesel engine, will be put into operation in the near future.

Everett D. Howe, associate dean of the college of engineering, says that at present none of the methods is economical. Improvements during the past year of research, however, have been encouraging.

Industry could benefit from the solution of the problems involved, by using heat, now wasted in cooling towers of industrial plants, to distill water.

Funds for the work have come from the California State Legislature and the Department of Interior.

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BIOCHEMISTRY

New Anti-Ameba Drug

➤ A NEW kind of drug that kills amebas is now ready for extensive trial in patients with amebic dysentery, or amebiasis, Drs. E. W. Dennis and D. A. Berberian of Sterling-Winthrop Research Institute, Rensselaer, N. Y., announced at the meeting of the American Society of Tropical Medicine and Hygiene in Louisville, Ky.

So far it has been tried in three patients, and in monkeys and hamsters. In all of these, it cleared the amebic infection in from two to five days.

The drug is known by its laboratory name, WIN 5047. Its chemical name is n-(2,4-dichlorobenzyl)-n-(2-hydroxyethyl) dichloroacetamide. It was synthesized at Sterling-Winthrop by Dr. A. R. Surrey and co-workers.

Unlike most of the commonly used drugs for amebic infection, WIN 5047 contains no arsenic or iodine, which are likely to cause reactions in sensitive persons. The new drug is highly specific, killing the amebas but not affecting the bacteria normally found in the intestines.

Its safety is shown by the fact that monkeys were not harmed by taking it for three weeks in 13 times the dose, on a body weight basis, used to treat humans who would need only the much smaller dose for one week.

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NATURAL RESOURCES

2,000-Year-Old Cisterns Help Reclaim Desert

➤ CISTERNS 2,000 years old may be used by irrigation engineers to help reclaim the Negev desert area in Israel.

Dr. W. C. Lowdermilk, American soil scientist and adviser from the Food and Agricultural Organization of the United Nations to Israel, has said that technical experts can learn much from an irrigation system set up by the Nabataeans in the Negev area 2,000 years ago.

The cisterns have capacities up to 75,000 cubic feet and were used in ancient times to catch and store water during storms and flash floods. The water was then doled out in the long dry season to irrigate crops. The experts now recommend that they be put to use again.

This tribe may have used mounds of flint rock fragments as dew mounds. The wind blowing between the flints would have deposited moisture on the stones, watering olive trees and vines planted in the mounds.

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BOTANY

Scientists Develop New Berry Plant

➤ A NEW fruit for eastern United States may be developed from a successful crossing of blackberries with red raspberries at the New York Agricultural Experiment Station in Geneva.

The loganberry, youngberry and several European berries that are very popular began with similar crosses, but cannot be grown successfully in the East. The cross is also important because eastern blackberries and red raspberries are hardier and more disease resistant than their western relatives.

The new plant produces fruit characteristic of both parents, and it will be tested rigorously to determine its real merits and growth possibilities.

Crossing different species seldom produces fertile offspring. The scientists used 50 different crosses with more than 1,800 flowers to obtain the fertile hybrid plant.

They found that raspberry pollen applied to blackberry pistils fails to produce seedlings that will grow to maturity. Blackberry pollen on raspberry pistils, however, produced some vigorous seedlings which produced flowers and fruit.

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LIFE-SIZE BERRY — This picture shows a new, crossed berry in its actual size.

"BIG JIM" RADIO STATION—Looped in giant strands across Jim Creek Valley, Arlington, Wash., 150,000 feet of steel copperweld cable form the largest radio antenna ever constructed. This is a bird's-eye view through the steel framework of a 200-foot summit ridge tower showing the transmitter building in the valley between 3,000-foot mountains. Special precautions have been taken to protect personnel from the invisible but dangerous energy at the most powerful radio station known to the Western world.

ELECTRONICS

Teeth Can "Tune In"

Antenna stretching across a mountain valley is used to send low frequency messages to U. S. Navy units around the world with power to punch through magnetic storms.

➤ THE NAVY'S "Big Jim" radio station is so powerful that its operators may be able to "tune it in" on their tooth fillings.

Situated on a 6,000-acre tract about 55 miles northeast of Seattle, Wash., the million-watt station began flinging its official messages around the world to ships on and under the seas on Nov. 18.

Although the Navy has received no reports that anyone so far has "heard" dits and dahs in their mouths during try-out tests, the station's signal strength is so great that this is a distinct possibility.

However, Americans need not fear that the cryptic chatter of a telegraph key in their tooth fillings will keep them awake at night. The Federal Communications Commission states that this unusual type of reception is generally restricted to within a mile of powerful stations.

C. B. Plummer, chief of the FCC's broadcast bureau, explains it this way: When two unlike materials touch each other, current induced in them sometimes flows more easily in one direction than in another at the point of contact. This sets up small electric currents that can be heard as music or voice without a radio receiver. Early cat-whisker radio sets used the phenomenon.

Thus an amalgam filling touching tooth enamel can produce the tiny currents if the conditions at the point of contact are just right.

The radio commission that antedated the FCC once received a report from an elderly woman who claimed she could pick up a strong station on her frying pan. A scientist at the National Bureau of Standards remembers a woman who said she heard music in her head all of the time. He could not recall, however, whether she could pick up commercials too.

Many persons who "hear" strange things actually have hallucinations.

Engineers at Cincinnati's WLW once told the FCC about a boy who climbed out of his swimming hole to report he could hear WLW underwater. Station engineers took a quick dip to test the boy's veracity. They heard the program also. The phenomenon was traced to two submerged rocks lightly touching each other. At that time the station was broadcasting 500,000 watts of power. It is a 50,000-watt station today.

A guy wire on the antenna of an eastern FM station was found so "hot" that an electric arc jumped between it and a piece of metal held in the hand half an inch away, and the station's program was heard in the electric flame.

Plenty of invisible, dangerous radio power surrounds the Navy's new Big Jim station. To make things safe, engineers installed a ground mat extending 2,700 feet in all directions from the radio transmitter. Providing a good electrical connection with the ground, the mat required 280 miles of copper wire.

A special grounding system has been provided for station operators who drive their cars to work. A metal bar projects into each parking space. The driver eases his car into the space until the bumper touches the ground bar. If he fails to do this, the motorist may receive a severe burn from radio waves as he alights from his car.

The new Navy station is operating in the very low frequency radio range, and should not interfere with commercial broadcasting. Its maximum power, about 22 times more than any licensed broadcast station in the U. S., is great enough to override magnetic storms and interference that normally slash the range of less powerful stations.

Science News Letter, November 28, 1953

PHYSICS

Human Eye Keener Than Film or Other Detectors

➤ THE HUMAN eye is more than a hundred times keener than photographic film or devices that detect heat and light, experiments by Dr. R. Clark Jones of the Polaroid Corporation, Cambridge, Mass., have demonstrated.

By combining experimental results from other measures of the human eye's functioning, Dr. Jones has determined that a measure of the ability to detect light is 35,000 for the human eye compared with about one for the best thermocouples, which are heat-detecting devices. For photographic film of high speed (Super-XX) it is about 200, and for a good lead sulfide photoconductive cell it is about 350 on the same scale.

A short light pulse gives the best performance of the human eye with respect to other detectors. The angular size that gives the best performance of the eye relative to other detectors is a size anywhere from the angular diameter of the moon to ten times that of the moon.

Science News Letter, November 28, 1953

AERONAUTICS

Airplane-Design Graphs Warn of Thermal Barrier

➤ ADVANCE WARNING of how the formidable thermal barrier will attack tomorrow's supersonic planes now can be obtained quickly from new graphs created by New York University research engineers under an Air Force contract.

The graphs permit aircraft designers to predict almost at a glance how hot the plane's "skin" will become as it rams through the air at speeds up to five times the speed of sound. At this speed, planes generate scorching heat due to air friction.

Called the thermal barrier, this frictional heat has become one of the aircraft designer's major problems. It is as imposing today as the sonic barrier was a decade ago. The heat affects not only the mechanical performance of the plane or missile, but also its fuel, interior equipment and human or automatic pilot.

Under the direction of William D. Murray and Lawrence Slote, the New York University research team confirmed that to cool the total surface of an airplane flying five times the speed of sound requires as much refrigerating equipment as would be needed to air-condition a large building in the tropics.

By studying and analyzing a flat plate under known conditions, the research team was able to produce graphs which, with minor modifications, can be applied to aircraft surfaces. The graphs permit engineers to determine quickly the temperatures that will be encountered by planes flying as high as 100,000 feet and at speeds of five times that of sound.

Science News Letter, November 28, 1953

GENERAL SCIENCE

Scientists, Students Urged to Learn Russian

➤ AMERICAN SCIENTISTS should possess a reading knowledge of Russian and this language should be a required subject in studies leading to a Ph.D. degree in scientific fields.

This was advocated by Dr. Irving S. Bengelsdorf of the University of California at Los Angeles, who has made a special study of scientific Russian.

The increasing eminence and future development of Soviet science make it imperative that well-informed American scientists keep abreast of scientific developments in the U.S.S.R., he said.

Although abstracts of Soviet journal articles have become available in recent years through a State Department exchange program, it is often more desirable for the scientist to read the original article.

Dr. Bengelsdorf found it necessary to learn the difficult language to thoroughly explore his current field of investigation—organophosphorus compounds. Most of the literature on the subject was in Russian, as Soviet scientists had performed the majority of work in this field.

"It is evident that the Russians are creating a vast pool of trained scientists, which may soon be larger than the number of trained scientific personnel in this country," he declared.

"Scientists in Russia belong to the upper stratum of the 'classless' Soviet society. The prestige and relative economic and social advantages of a scientific career is a great factor of attraction to young Soviet intellectuals."

Science News Letter, November 28, 1953

BIOCHEMISTRY

Pituitary Plays Part In Fat Utilization

➤ THE OVERWEIGHTS and underweights in the population may, at least some of them, be able to blame their condition on their pituitary gland, famous as producer of anti-arthritis ACTH.

Studies suggesting this were reported by Drs. E. B. Astwood, M. S. Raben, I. N. Rosenberg and V. W. Westermeyer of Tufts College Medical School at the meeting of the National Academy of Sciences in Cambridge, Mass.

The pituitary, these scientists think, may play an essential part in regulating normal utilization of fat during fasting. This suggests that it may be concerned in states of over- and under-nutrition.

The scientists from Tufts tested, on mice, a purified pituitary extract with adrenal stimulating properties called corticotropin. Tiny doses, they found, caused rapid mobilization of depot fat to the liver and a rise in the rate of body chemical processes when the mouse was fasting. In fed animals, the extract caused a lowering of the rate of metabolic, or chemical, processes. Larger doses protected both fed and fasted mice against convulsions and low blood sugar when insulin was given, but when given without insulin, the extract in the larger doses had the contrary effect of lowering the blood sugar.

Science News Letter, November 28, 1953

TECHNOLOGY

New Lightweight Hose Speeds Ship Refueling

➤ THE U. S. Navy has installed a seven-inch hose on its seagoing tankers to speed up refueling operations at sea.

The new hose weighs no more than the six-inch hose it replaces when both hoses are filled with oil. The weight saving was achieved by the elimination of heavy metal nipples, and through the use of a B. F. Goodrich special hose.

Because of its weight, the six-inch hose was the largest that could be handled easily at sea. The new hose is reinforced with high tension steel wires at points where it is suspended across water by ships' hoists.

Science News Letter, November 28, 1953

IN SCIEN

METEOROLOGY

Forecast Above Normal Temperatures

➤ ABOVE NORMAL temperatures for the eastern half of the nation, with the exception of the Gulf states, were predicted for the period until mid-December by long-range forecasters at the U. S. Weather Bureau.

However, Jerome Namias, chief of the Bureau's extended forecast section, pointed out that such a forecast does not mean that there will be no cold weather east of the Mississippi before that time. There seems to be, rather, a continuing, near-weekly alternation between cold weather and warm weather, and the warm weather spells on the whole will predominate in the eastern half of the country until mid-December.

West of the Continental Divide and in west Texas, the long-range forecasters predict that temperatures will average below normal until mid-December. In the regions not specified, near normal thermometer readings are expected.

The precipitation, which can be either snow or rain for much of the country at this time of year, is expected to be "in excess of normal" over most of the nation, except in the South Atlantic and northern plateau states, where subnormal amounts are in prospect.

Science News Letter, November 28, 1953

VETERINARY MEDICINE

Vaccine to Be Tested On Thailand Cattle

➤ THE VACCINATION of 70,000 cattle in Thailand before next June will test a new vaccine for hemorrhagic septicemia, a serious and often fatal animal disease in many parts of the world.

The vaccine was developed by Dr. R. V. S. Bain of the University of Sydney, Australia, who did a part of the research for the vaccine in this country on a Fulbright scholarship.

Hemorrhagic septicemia annually flares up in Thailand at the start of the monsoon season in July. The cattle will be vaccinated to test the vaccine under field conditions. The mass vaccinations will be done through the Food and Agriculture Organization of the United Nations.

Most American veterinary scientists believe that cattle shipping fever in this country is a different form of hemorrhagic septicemia and the vaccine will probably not be useful here. The disease is of minor importance here.

Science News Letter, November 28, 1953

E FIELDS

TECHNOLOGY

"Electronic Machinist" Works Like Phonograph

➤ MAKING A specialized airplane part some day will be as easy as putting a record on the phonograph.

An electronic machine control being built in Schenectady, N. Y., will do the trick, taking its instructions from a magnetic tape instead of a phonograph disk. The control will tell the machine what to do and, without human attention, the machine will turn out the part.

The tape of instructions will be made when a human operator first makes a part he wants "recorded." As the machinist works his tool to produce the part, the motions are translated into electrical impulses and deposited on the recording tape for future playback to produce the part.

Currently under development by General Electric engineers, the first commercial model of the "electronic machinist" is scheduled for shipment in early 1954. It will serve as the nerve center for a milling machine and is expected to double production speed of self-reinforced "skin" structures for jet planes.

Science News Letter, November 28, 1953

SURGERY

Blood Shunting Saves War Jaundice Victims

➤ FOR THOSE of the 60,000 to 80,000 World War II veterans whose livers may now be showing damage from jaundice suffered during the war, a blood-shunting operation may prove life-saving, Dr. Robert Coffey of Georgetown University Medical School, Washington, told members of the Association of Military Surgeons of the United States meeting in Washington.

Some of these veterans got jaundice from the liver infection called epidemic hepatitis. Others got it from the early yellow fever vaccine shots. More and more of them, Dr. Coffey said, are now getting into the chronic state in which the disease-scars of the liver cause obstruction of the portal vein which drains the liver. As a result, too much pressure builds up in this vein system and massive bleeding from enlarged veins in the esophagus occurs.

Half of those who bleed from these esophageal varices will die within a year from further bleeding, Dr. Coffey said.

The blood-shunting operation he described stops this. The operation shunts blood from the portal vein to the vena cava, which is the main vein of the body. This lowers the presure in the liver vein system by 300 to 400 millimeters of water and thus averts the danger of further bleeding. With the patient saved from this immediate danger, medical men can treat the liver to improve its condition.

Besides the liver damage, some of these jaundice patients also develop an enlarged spleen. In such cases surgeons can remove the spleen and connect the splenic vein to the kidney vein which again detours the blood to the general vein system of the body.

Science News Letter, November 28, 1953

GENETICS

Breeding Short-Cut For Plants Successful

➤ NEW PLANTS will be produced years earlier than previously possible by use of a powerful drug that fixes a desired characteristic for heredity, Dr. J. G. Ross and C. J. Franzke of the South Dakota Agricultural Experiment Station reported at the American Society of Agronomy meeting in Dallas, Tex.

Colchicine has stabilized the characteristics of a new strain of sorghum seedlings in a single year so that the characteristics are transmitted to succeeding generations. Treatment of sorghum seedlings with colchicine produced a wide variability in the plants, the agronomists said. The treatment then fixed a chosen characteristic for transmission to later generations.

In the past, plant breeders have often spent many years developing a plant strain with certain desired characteristics. Frequently the seed of such plants is sterile or the characteristics are not transmitted to succeeding generations.

An examination of four generations of the sorghum seedlings in their experiments showed that, under controlled conditions, the desired changes in the plant were immediately and permanently established in the new varieties, they said.

Science News Letter, November 28, 1953

PSYCHOLOGY

Different Tests Give Different I.Q. Scores

➤ IF YOUR child gets a higher IQ rating on a school intelligence test than he did some time ago, it does not necessarily mean that he is getting brighter.

When the same examiner uses different tests to measure the mental ability of the same child, the results differ even when the tests are given within three months. This was reported in *Science* (Nov. 13) by Dr. Ralph Mason Dreger of Florida State University.

The scores of one six-year-old child tested under Dr. Dreger's direction varied from 89 to 111, those of an eight-year-old from 101 to 153. An IQ of 100 is normal.

In spite of these differences in the scores of individuals on different tests, the average for the group was found to be just about the same.

Science News Letter, November 28, 1953

MARINE BIOLOGY

Arctic Shrimp Have Big Beds But Small Sizes

➤ THE WORLD'S largest individual shrimp beds have been found off the coast of Greenland, but the chances are you will not get any Arctic shrimp as appetizers.

Shrimp taken in northern waters tend to be half the size of the familiar Gulf of Mexico shrimp. Running nearly 100 shrimp to the pound, the market for them in the past has been small.

Dr. Paul Marinus of Denmark has reported the discovery of the beds to the Northwest Atlantic Fisheries Commission. It is possible that the Danes may try to develop the fishery.

Frozen peeled shrimp from Iceland were once imported into this country but the experiment was not successful. American housewives are too fond of the jumbo shrimp from the Gulf of Mexico, which usually runs around 40 shrimp per pound but may go as low as 25 to 30.

The Greenland shrimp beds are all in the Disko Bay region about halfway up the western coast of the huge island. Each bed is 10 miles long and five miles wide.

Similar northern shrimp are caught off the coast of Maine and Alaska. They are usually marketed after boiling and shelling as peeled shrimp.

Science News Letter, November 28, 1953

PSYCHOLOGY

Bronze Plate Rated Human Qualities in 1826

➤ "RATING SCALES" are not a new thing after all. This device for showing the judgment of a supervisor or teacher with regard to personality traits of an employee, applicant or student has in recent years come into wide use.

Now it has been found that such a scale was invented more than 100 years ago by Robert Owen, leader of the New Harmony social experiment and leader in improved educational methods. Discovery of what is now believed to be the original rating scale in the New Harmony museum is reported by Prof. Douglas G. Ellson, psychologist of Indiana University, and his wife to the *Psychological Bulletin*.

Owen's scale was not printed on paper as are the modern counterparts. It is a bronze plate, seven by 12 inches. The list of personality traits includes courage, strength, imagination, memory, affection, judgment, self-attachment, reflection, perception and excitability. Opposite each trait is a sliding strip which, before the scale was damaged by fire, could be set anywhere on a scale of 100 points. The Duke of Saxe-Weimar reported seeing Owen's scale on a visit to New Harmony in 1826.

Previously, invention of the rating scale has been credited to the anthropologist, Sir Francis Galton of England, in 1884.

Science News Letter, November 28, 1953

ASTRONOMY

Jupiter Shines in East

Jupiter is only naked-eye planet visible in December's evening hours. Two of the "brightest" sources of celestial radio waves can also be seen.

By JAMES STOKLEY

➤ TO THE brilliant array of winter-time evening stars that now make their appearance in the eastern sky, an even more brilliant addition has been made. This is the planet Jupiter, which shines high in the east in the constellation of Taurus, the bull.

The only naked-eye planet now visible during the evening hours, it is brighter than any of the stars, hence it is easy to find.

The most characteristic configuration among these brilliant stars of winter evenings is Orion, the warrior, which is just below Jupiter. There are three stars in a row, forming Orion's belt.

Above the belt, as they should be, are two stars marking the giant's shoulders. Betelgeuse, to the left, is a star of the first magnitude; the other, Bellatrix, is somewhat fainter.

On the opposite side of the belt from Betelgeuse is Rigel, also of the first magnitude, in one leg according to the old star maps that depicted the mythological figures around the stars.

First Magnitude Stars

According to these fanciful ideas, Orion was holding a club and a lionskin, protecting himself from the charge of Taurus, the bull, represented by the constellation above and to the right. This is the present abode of Jupiter, the brightest star being Aldebaran, which marks the animal's eye. It is distinctly red in color. The two stars close to Jupiter are the tips of his horns.

The upper horn extends into the constellation of Auriga, the charioteer, where we find another star of first magnitude — Capella. Below Capella are the twins, Gemini, with Castor and Pollux, the latter being the brighter. Going down still farther, and more to the right, we come to Orion's two dogs.

Canis Major, the lower, contains brilliant Sirius, the dog star, most brilliant star visible in the nighttime sky. It is so bright that its magnitude goes into the negative numbers, minus 1.6. But even this does not equal Jupiter, which is minus 2.3 on this magnitude scale, meaning that it is about twice as bright as Sirius.

Because Sirius is much lower in the sky, its light is absorbed to a greater degree than that of Jupiter, and this accentuates the difference in brightness of the two bodies. Procyon, in Canis Minor, the lesser dog, is higher and farther left.

All these stars are indicated on the accompanying maps, which show the appearance of the heavens about ten o'clock, your own kind of standard time, on Dec. 1, about 9:00 p.m. at the middle of December and 8:00 p.m. at the end.

Although no other part of the sky contains as brilliant an array of stars as the region around Orion, even without the presence of Jupiter, two other first magnitude stars can be seen toward the east. Being rather low, they too are dimmed by absorption of the atmosphere.

The symbols which are used to designate them are those for fainter stars, since these symbols are applied in accordance with the way they look. Close to the northwestern horizon is Vega, in Lyra, the lyre, about to disappear for a time. Above it is Cygnus, the swan, with Deneb as the brightest star.

Other Star Figures

Some other well-known star figures can be found in this part of the sky, however. Above Cygnus, a little to the left, is Pegasus, the winged horse, with the large quadrangle of stars called the "Great Square." And about as high, farther to the right, is Cassiopeia, shaped like a letter M.

This is supposed to represent a queen of ancient times, seated on her throne. The king, Cepheus, her husband, is the constellation below, while her daughter, the princess Andromeda, is above.

In the early morning hours of December several more planets come into view. At the beginning of the month Mars, in the constellation of Virgo, the virgin, rises about four hours ahead of the sun. Then, about two hours before sunrise, Saturn appears.

For a few days around Dec. 1, Mercury comes up in the southeast more than an hour and a half ahead of the sun. Still later, as the sky is beginning to brighten, Venus appears, even more brilliant than Jupiter.

One of the most striking developments of astronomy in recent years has been the discovery of celestial broadcasting "stations," definite regions in the sky from which very short radio waves are continuously being emitted. Two of the "brightest" of these radio "stars" are in the part of the sky visible on December evenings.

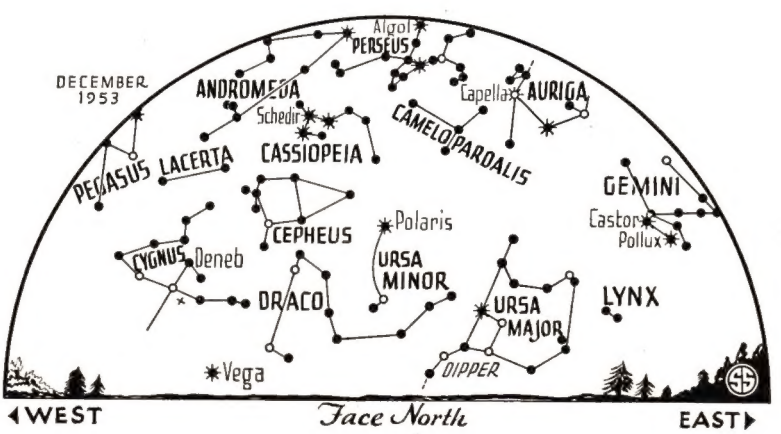
The first discovery of a discrete source was when radio waves were found to be coming from the sun. This was not too surprising, since radio waves are the same as the waves of visible light, though of considerably greater wavelength. Just beyond the visible spectrum, made of waves just a little too long to be detected by the eye, is the infrared, which has long been known in various ways. Short waves can be considered as very long infrared waves.

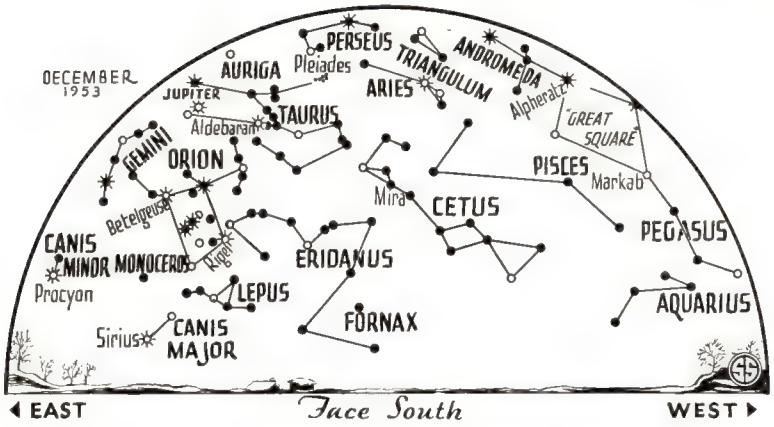
However, there was a discrepancy in that the surface temperature of the sun has been found, in various ways, to be about 11,000 degrees Fahrenheit while it was calculated that nearly a million degrees would be needed to produce the radio effects that had been observed. It was also determined that the radio waves came from a larger area in the sky than the visible disk of the sun.

It is known that the sun is surrounded by a much more extensive region, the corona, which can be seen at the time of a total eclipse, and so it looked as if the corona might be the source of the solar radio waves.

Moreover, from other considerations, it had been found that the corona seemed to have a temperature of something like a million degrees. Just how it gets to be so much hotter than the solar surface underneath is something for future research to reveal.

Wartime work on electronics, particularly





in the development of radar, led to many new techniques for detecting faint radio waves and determining the direction whence they are coming.

Some of these same methods have been applied in "radio telescopes," which have revealed, in various parts of the sky, a number of discrete radio sources, called radio "stars." Two of the most intense of these in the northern hemisphere are in parts of the sky now visible in the evening, and shown on the maps.

Strongest Radio Source

The strongest of all is one in Cassiopeia, between the western part of the M and Cepheus, below. The first A in the name Cassiopeia marks its approximate position. The other, the second most intense, is in Cygnus, at the position indicated by a small X on the map of the northern sky.

While the radiation from the sun varies in intensity as much as a million times, that from the radio "stars" is much more constant. But even an average radio "star" emits radio wave radiation that is a hundred times as great as that from the sun when most disturbed, and the source in Cassiopeia is perhaps a hundred times stronger than the average radio "star."

Using light waves, the position of a source can be determined with a telescope with great precision. This depends on the size of the telescope lens or mirror, as measured in terms of the wavelength of light. Green light, about average, has a wavelength of 1/50,000th of an inch.

With a ten-inch telescope, which is of moderate size, the diameter of the objective is about half a million wavelengths. Radio telescopes may employ waves of about 15 feet wavelength. For the equivalent resolution of a ten-inch optical telescope, the dish—the concave reflector to collect 15-foot radio waves—would have to be some 7,500,000 feet, or more than 1,400 miles, in diameter!

Actually the largest radio telescope, at the Jodrell Bank Station in England, operated by the University of Manchester, is 250 feet in diameter. The 50-foot radio telescope at the Naval Research Laboratory in Washington, however, has a resolving power of more than 50 times the 250-foot giant, because it tunes in on a shorter wavelength.

Thus, in the last few years, a whole new field in astronomy has been opened. In the opinion of many, application of radio techniques to the study of the heavens will rank in importance with the introduction of the spectroscope about a century ago.

This instrument has yielded a vast amount of knowledge as to what the stars are made of and the processes going on inside them.

Radio astronomy is so new, in fact, that much of the most important work has been done by radio engineers rather than astronomers. However, as the latter learn the new techniques, and as the engineers learn more about astronomy, they should be able to combine effectively in ferreting out many new facts about our universe.

Celestial Time Table for December

Dec.	EST	
1	1:00 p.m.	Mercury farthest west of sun.
	11:29 p.m.	Moon passes Mars.
3	7:15 a.m.	Moon passes Saturn.
4	4:01 p.m.	Moon passes Mercury.
5	4:33 a.m.	Moon passes Venus.
6	5:48 a.m.	New moon.
8	3:33 a.m.	Algol (variable star in Perseus) at minimum brightness.
11	12:22 a.m.	Algol at minimum.
12	early a.m.	Meteors visible radiating from Gemini.
13	11:30 a.m.	Moon in first quarter.
	12:00 noon	Jupiter opposite sun and nearest earth, distance 391,900,000 miles.
	9:11 p.m.	Algol at minimum.
16	9:00 a.m.	Moon nearest, distance 228,700 miles.
19	5:44 p.m.	Moon passes Jupiter.
20	6:43 a.m.	Full moon.
21	10:32 p.m.	Sun farthest south, winter commences in northern hemisphere.
28	12:43 a.m.	Moon in last quarter.
	10:00 a.m.	Moon farthest, distance 251,300 miles.
30	5:36 p.m.	Moon passes Mars.
	8:31 p.m.	Moon passes Saturn.

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, November 28, 1953

FORESTRY

Bark Beetles Are Most Serious Forest Enemy

➤ BARK BEETLES that destroyed 700,000,000 board feet of lumber in Montana and Idaho alone last year are perhaps the nation's most serious forest problem, the Forest Research Advisory Committee has reported.

The committee recommended to the U. S. Department of Agriculture that research on bark beetle control be expanded. In Colorado, 4,000,000,000 board feet of timber has been destroyed by beetles in the last 10 years.

The report also placed emphasis on study of diseases attacking seedlings in forest nurseries, study of root diseases of conifers, tree improvement and range reseeding.

Science News Letter, November 28, 1953

UNITRON

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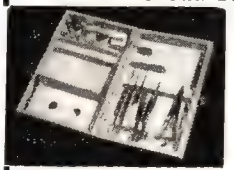

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• Books of the Week •

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N. W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

ADVANCES IN VIRUS RESEARCH: Vol. I—Kenneth M. Smith and Max A. Lauffer, Eds. — *Academic Press,* 362 p., illus., $8.00. Specialists in widely varying fields contributed to this volume.

BOOKBINDING AT HOME—Sidney Victor LeVine —*Victor,* 87 p., and bottle of glue, illus., $3.00. Step by step pictures and clear instructions introduce a popular hobby.

CAPT. NAT HERRESHOFF, THE WIZARD OF BRISTOL: The Life and Achievements of Nathanael Greene Herreshoff, Together with an Account of Some of the Yachts He Designed—L. Francis Herreshoff—*Sheridan,* 349 p., illus., $7.50. Telling about the development of boat design as well as the life of a designer.

COLOR DIGEST—*Higgins Ink Company,* 39 p., illus., paper, $2.00. Those who work with drawing inks need to become acquainted with a distinct scale of color that is not familiar to the artist who works with pigments.

THE COMPLETE BOOK OF OUTER SPACE — Willy Ley and others—*Gnome,* 144 p., illus., $2.50. Each chapter is contributed by an expert on space. Generously illustrated.

ENERGY IN THE FUTURE — Palmer Cosslett Putnam—*Van Nostrand,* 556 p., illus., $12.75. Report of a study, made at the request of the Atomic Energy Commission, estimating the maximum plausible world demand for energy over the next century.

EXHIBITION OF JAPANESE PAINTING AND SCULPTURE SPONSORED BY THE GOVERNMENT OF JAPAN — Bulletin of the Museum of Fine Arts — *Museum of Fine Arts, Boston,* 36 p., illus., paper, 25 cents. The description of this special exhibit is illustrated with many lovely black and white reproductions.

THE FIRST BOOK OF BOATS—Margaret Gossett —*Franklin Watts,* 44 p., illus., $1.75. Introducing small boys to many kinds of boats.

HEALTH YEARBOOK 1953—Oliver E. Byrd, Ed., Foreword by David K. Brace — *Stanford University Press,* 280 p., $3.50. Intended to help you keep abreast of the many new developments in public health and personal hygiene.

THE HISTORY OF THE WORLD IN TWO HUNDRED AND FORTY PAGES—Rene Sedillot, translated by Gerard Hopkins—*New American Library,* 254 p., paper, 35 cents. Writing on such a tremendous theme in such short space involved the selection of only those facts that seem most significant to the author.

HUMAN BEHAVIOR IN THE CONCENTRATION CAMP — Elie A. Cohen, translated by M. H. Braaksma — *Norton,* 295 p., $5.00. By a Dutch physician who was a prisoner at Auschwitz for three years. This book attempts to explain Nazi brutality in the fairest possible way. First conclusion of the author is that the human power of adaptation is very great. Neuroses and psychosomatic ills he found surprisingly rare.

ONE TWO THREE . . . INFINITY: Facts and Speculations of Science—George Gamow—*New American Library,* 319 p., illus., paper, 50 cents. Paraphrasing Lewis Carroll, the author says that in this book he talks of "atoms, stars and nebulae, of entropy and genes; and whether one can bend space, and why the rocket shrinks." Originally published by Viking in 1947.

SCHOOLS HELP PREVENT DELINQUENCY — NEA Research Division, *National Education Association of the United States,* 32 p., illus., paper, single copies 50 cents. The gun-toting, hot-rodding, vandal called the juvenile delinquent costs us up to $2,500 a year. This report suggests what the schools may do to keep him out of mischief.

SOIL STABILIZATION—L. John Minnick and others—*Highway Research Board,* 57 p., illus., paper, 90 cents. Of interest to engineers who plan and build soil-cement roads.

THE THEORETICAL BEHAVIOR OF AN INELASTIC MATERIAL MODEL—D. Frederick and M. A. Garcia—*Virginia Polytechnic Institute,* Engineering Experiment Station Series No. 85, 32 p., illus., paper, 25 cents. The mechanical behavior of an inelastic material lies somewhere between the action of a perfectly elastic solid and a viscous liquid.

THIRTY-ONE-YEAR RESULTS IN GROWING SHELTERBELTS ON THE NORTHERN GREAT PLAINS — Ernest J. George — *Gov't Printing Office,* USDA Circular No. 924, 56 p., illus., paper, 25 cents. Reporting experience in growing trees on the Northern Great Plains, almost treeless naturally.

WONDERS OF MODERN MEDICINE — Steven M. Spencer with foreword by George F. Lull — *McGraw-Hill,* 276 p., $4.00. A science writer reports some of the great strides made during the last ten years.

WORLD POPULATION AND PRODUCTION: Trends and Outlook—W. S. Woytinsky and E. S. Woytinsky—*Twentieth Century Fund,* 1268 p., illus., $9.00 until Jan. 1, 1954, $12.00 thereafter. A picture of the collective resources and promise of all the nations of the world. The Fund hopes that this panorama may give the reader courage to face the dangerous days ahead.

Science News Letter, November 28, 1953

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". . . Another measure of the Fair's effectiveness is the numbers of people who see the Fair as observers, not participants . . . it seems clear that the Fair is making real gains on the school level . . ."—Survey of the First Two Years of the Southern California Science Fair

". . . One of the finest new developments for students in this state . . ."—Hon. J. Caleb Boggs, Governor of Delaware

". . . gave exhibitors and all the rest of us more science in a few days than we could ever hope to get anywhere else . . . We consider our Science Fair one of the best promotion devices for getting and holding public approval . . ."—Clifford A. Shaw, Promotion Manager, *The Providence Journal and Evening Bulletin,* R. I.

". . . We need desperately an ever growing resource of scientific skill . . ."—Very Rev. Paul C. Reinert, S.J., President, St. Louis University, St. Louis, Missouri

". . . We should not be short-sighted in predicting what the youth of America can do in the field of science . . ."—E. B. Garnett, Sunday Editor, *Kansas City Star,* Kansas City, Missouri

". . . Fairs of this sort engender a great deal of enthusiasm through the participation of students and their teachers and schools . . . the program has benefited the University . . ."—Dr. David A. Lockmiller, President, University of Chattanooga, Tenn.

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". . . A constant crop of young scientists will be the key to the future strength of the United States . . ."—Editorial, *Midland Daily News,* Midland, Michigan

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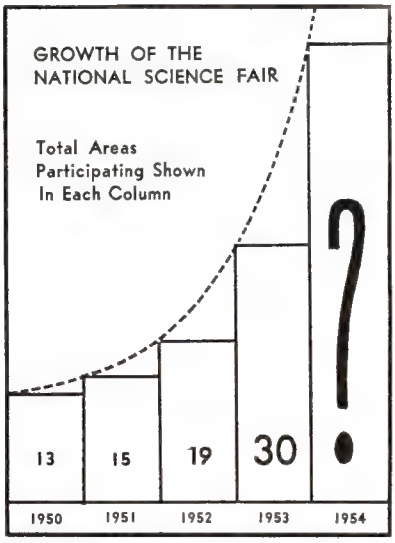

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PSYCHOLOGY

Orange Juice Colors

▶ ORANGE JUICE tastes better when it has a dark orange color than when it is lemon yellow. At least, that is what the average consumer thinks, Howard G. Schutz, psychologist at the Quartermaster Food and Container Institute, Chicago, has discovered.

Consumer preference experiments show a significant preference for juice colored dark orange to juice colored a distinct yellow, he reported at the National Research Council's Symposium on color in foods.

Later, when coloring the yellow juice made it dark orange also, no preference was expressed by consumers.

Color serves as a quality label for consumers, Mr. Schutz said. One group given a high quality juice with a natural color, rated succeeding low quality juice colored dark orange lower than a group that first received the high quality juice colored dark orange.

Mr. Schutz attributed this result to the fact that the first high quality sample created a color-quality label in the minds of the consumers.

He cautioned against separating color from the many factors influencing food dislikes and likes, and emphasized that his experiments using naturally and artificially colored orange juices covered only a small part of the total problem.

Science News Letter, November 28, 1953

• RADIO

Saturday, December 5, 1953, 3:15-3:30 p.m., EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. Hans Adolf Krebs, professor of biochemistry at Sheffield University, England, will discuss "Converting Food to Human Energy." Dr. Krebs has been awarded the Nobel Prize in medicine and physiology for 1953, which he shares with Dr. Fritz A. Lipmann. Dr. Krebs is the recipient of the 1953 Lasker Award of the American Public Health Association.

ANTHROPOLOGY

Piltdown Man Is Hoax

▶ THE GRAND picture of man's evolution from a common ancestral line with the apes and monkeys is unshaken by the exposure of the Piltdown man hoax in England.

For this so-called Dawn man or Eoanthropus, now dethroned, was never considered anything more than a remote cousin that left no descendants. Darwin is still right and continued anthropological discoveries, in recent years, strengthen instead of weaken the fact of our rise along a line of ancestry common to other primates, although Homo sapiens left his closest ancestors a few millions of years ago.

The direct line of man's rise is still dim in the ancient past, but the evidence today is that man's birthplace as a creature more human than ape was in Africa where fossils of ape-men have been found.

Proof by British Natural History Museum scientists that the Piltdown jawbone is actually that of a modern ape will be received with relief by many experts, for the skull and the jawbone did not match in the opinion of many authorities who have studied them since their discovery in a southern England gravel pit before the First World War.

Exposure of a blatant but clever forgery shows the possibly orangutan jaw was given an aged brown appearance by potassium bichromate and iron salt treatment, and the teeth were pared down to seem worn in a human manner.

Among those questioning the authenticity were Dr. Gerrit S. Miller, Smithsonian Institution mammalogist, who 25 years ago said the skull belonged to a man and the jaw and teeth to an ape, and the late Dr. Franz Weidenreich of the American Museum of Natural History who, as recently as 1947, held that the form and individual features of the Piltdown brain case are those of modern man and the lower jaw anthropoid in characteristics.

For a number of years the British scientists have investigated the authenticity of the Piltdown fossils. In 1949 at the British Association for the Advancement of Science meeting, Dr. K. P. Oakley, who has now exposed the hoax with Drs. J. E. Weiner and W. E. Le Gros Clark of Oxford University, demoted the fossils to much less than their presumed half million or million years age. Their age is now put at 50,000 years, as determined by the amount of fluorine they took up from the ground water.

Science News Letter, November 28, 1953

It has been found that some synthetic *antibiotics* produced for medical use protect cotton cloth against mildew better than chemicals now used for that purpose.

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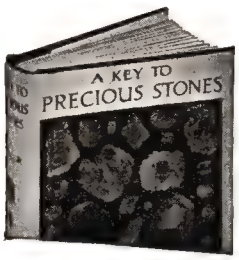

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BIOLOGY

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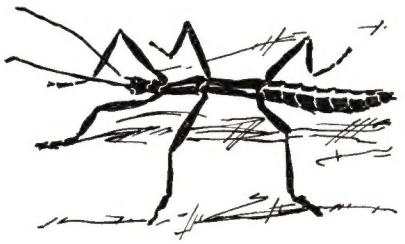

Walking Stick

➤ THIS STRANGE insect is designed with such a close resemblance to a twig that as long as it remains immobile, it stands an excellent chance of escaping detection. But if you keep your eyes peeled in the country and you suddenly see a stick walking, it's probably a walking stick.

Now that the frost has come you are likelier to see some of the queerer creatures of the insect kingdom, sluggishly dragging themselves about in the relative warmth of noon. This time just before the deep snows is a good time for observing walking sticks.

The common walking stick of the United States is related to many similar insects, many of which abound in the tropics. One characteristic that this family of insects shares is the remarkable imitation which each species has managed to achieve of the twigs of its local environment. Some of the tropic varieties especially so cleverly mimic the appearance of their surrounding leafy vegetation that trained observers are frequently fooled.

It is remarkable that an insect which blends so perfectly with its environment as to seem to be immune from all predators, does not become so abundant as to be a pest. This may be because there is only one generation per year and the number of eggs laid by each female is about one hundred. Compared to most other insects, notoriously fertile and prolific, this is very restrained rate of reproduction.

Like the grasshoppers to which they are closely related, walking sticks are vegetarians. Their color changes with the season, being green during the summer, turning to gray and brown later in the year. This change in color is actually part of the maturing process of the insect. The young hatch out about May. At this stage they are a pale green. They molt twice without change of color. As they develop into mature insects their color changes to the darker hue, more suitable to the color of fall vegetation.

The walking stick's manner of laying eggs is in keeping with its camouflaged appearance. Instead of fastening them to a leaf or depositing a heap of them in some natural recess somewhere, the female drops her eggs on the ground. These eggs, like the parents, are cleverly imitative also. They look like seeds of some plant, and they are scattered about loosely on the surface of the ground.

Where an egg falls, next spring there will probably hatch out a young walking stick. The egg is the winter hiding place for the developing, hibernating insect. By spring the brand new walking stick is ready to emerge. The warm spring sun signals to it. It pushes on the top of the shell. And lo, it lifts up like the top of a hinged box. And another walking stick steps forth, to live out its harmless summer, and to leave deceptive seedlike eggs on the ground, its bid for immortality.

Science News Letter, November 28, 1953

Engineering studies are under way to determine if *TV cameras* can be designed so that drillers can see what is going on at the bottom of the well.

Questions

AERONAUTICS—What are three causes of airport noise complaints? p. 341.

□ □ □

CYTOLOGY — Why are fused cells being studied? p. 340.

□ □ □

PSYCHOLOGY—When was the first "rating scale" devised? p. 345.

□ □ □

TECHNOLOGY — How does an "electronic machinist" work? p. 345.

What are three possible methods of freshening sea water? p. 342.

□ □ □

Photographs: Cover, Douglas Aircraft Company, Inc.; p. 339, Sperry Gyroscope Company; pp. 341 and 343, U. S. Navy; p. 342, Robert A. Wesselmann; p. 352, Bakelite Company.

Tests on wheat, rice and cotton seed show that high-frequency electromagnetic fields of force, employed in the *dielectric heating* process, can kill rice weevils and pink bollworms.

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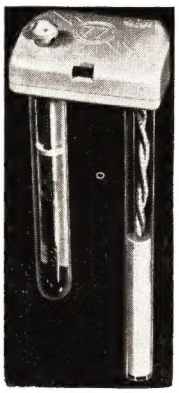

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FIREWOOD CARRIER, a novel item for town and country, reduces effort in gathering and bringing in suitable-sized logs for fireplace use. The device is a canvas strip about 16 inches wide with sturdy dowels attached to each end. When placed side by side, the dowels double as a handle and the device is carried like a suitcase.

Science News Letter, November 28, 1953

FISHERMAN'S KNIFE contains the usual small and large pocket knife blades plus scissors for cutting line, tweezers for making flies, a fish scaler and hook disgorger, can opener, screwdriver blade combined with cap lifter, a Phillips screwdriver and a hole puncher. Made in Switzerland, the stainless steel knife will not rust or corrode in fresh or salt water.

Science News Letter, November 28, 1953

WASHBOARD GLOVE for housewives is made of vinyl resins and features a ribbed surface that helps the user get stubborn spots and stains out of work clothes before running them through the washing machine. Flexible enough to be carried in a pocket, the glove, shown in the illustration, is particularly suited for use in hand-laundering "light" items of clothing.

Science News Letter, November 28, 1953

PERSONNEL RADIATION meter alarms audibly when the user receives an over-dose of dangerous gamma radiation. Weighing only nine ounces, the device can be looped to the belt and goes into operation automatically when turned face up. It also can be used as an area monitor.

Science News Letter, November 28, 1953

AUTOMOBILE MUFFLER, now available as a replacement unit, muffles engine noise with strands of chopped glass fibers. The glass threads, however, permit exhaust gases to follow a "straight-through" path that is said to reduce back pressure on the engine and yield a horsepower increase.

Science News Letter, November 28, 1953

BICYCLE LIGHT bulb for headlights works on eight flashlight cells or a six-volt hand-lantern battery and is said to throw more than twice the light of most bicycle headlamps now in service. It is designed to fit present headlamp cases with only slight modifications in reflector heads and battery cases.

Science News Letter, November 28, 1953

MOVIE PROJECTOR for 16 mm film is portable yet uses a carbon arc to produce brilliant white light that gives extra snap to the projected picture. The quality machine reproduces optical sound tracks and can be adapted to reproduce magnetic tracks. It is especially useful in industrial and school auditoriums and at outdoor gatherings.

Science News Letter, November 28, 1953

EMERGENCY POWER generator for the home comes on automatically when commercial electric power service is interrupted, such as might happen during storms. The gasoline-powered device has a steady running capacity of 3,000 watts, enough power to feed necessary appliances in the average home.

Science News Letter, November 28, 1953

CHEMISTRY for Christmas

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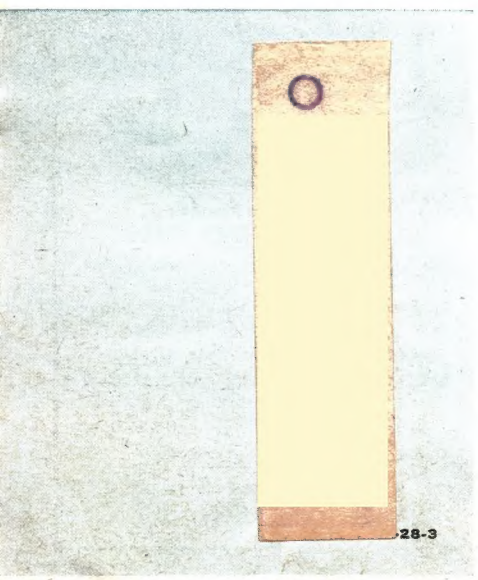

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